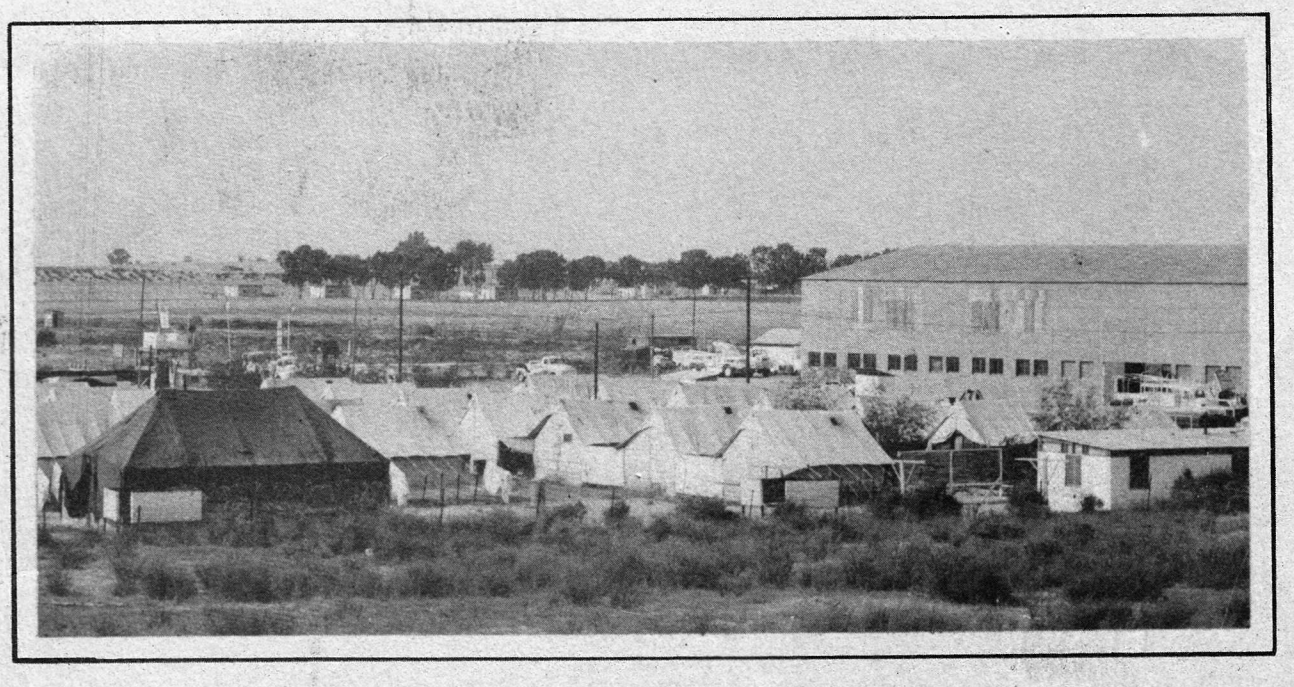
RCEME TECHNICAL BULLETIN



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DIRECTORATE OF ELECTRICAL AND MECHANICAL ENGINEERING

RCEME
TECHNICAL BULLETIN

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Cover: 56 Infantry Workshop:
Part of tent lines and shop, looking north east.

WORK HABITS AND HABIT PATTERNS

by Lt-Col AG Sangster

Habit, by definition, is "a settled tendency or practice". It is a characteristic of all life forms and consists of conforming to environmental conditions for the basic purpose of survival. Creature comfort is closely associated with survival since it increases the sense of security even if only temporarily. Industry has recognized the value of habit for many years. In 1912 James Harkness wrote of habit.

"Its importance in the industrial world is that it is the condition of mind and body by which a man acts with greatest precision, ease, comfort and efficiency. It is a condition that must not be carelessly disturbed, for there is found to be a deep-rooted antipathy to abrupt change".

Habits are acquired by experience or by training but either way the initial motivation is survival. Fundamental habits are created in the formative years before adolescence and dominate behaviour patterns in times of stress or emergency. At other times these fundamental habits can be overshadowed by other habits acquired for reasons of conformity to either community life or working conditions.

In the combatant elements of the armed forces, training programs are designed to create new habits which will dominate behaviour patterns to the degree demanded by the operational plans.

In RCEME, it may be possible to exploit many established habits to get the most out of a man. Of course trade training must be superimposed and there are administrative regulations to be conformed with. However fundamental habits must be recognized and studied otherwise resistance to change may reduce efficiency. As an extreme example a left-handed mature worker would be useless if forced to work right handed and vice versa.

The human brain is an organic central registry with an immediate access filing system and built-in computer. To create a habit calls for training in how to act when certain conditions occur. This is equivalent to developing and proving a computer program. A child approaches a hot stove and pokes out a finger. On contact he feels sharp pain and withdraws his finger since pain is a sign of threat to survival. Immediately the brain files this away and the next time he approaches heat the habit pattern brings forward the file and sets up the action of stopping or backing away. The reasoning process is bypassed. The reaction time will vary with the individual therefore it is advisable to assign workers with slow reaction time to employment where industrial hazards are at a minimum.

In order to create useful work habits work methods must be studied and operations broken down to the most complete subdivision possible. This leads to specialization and efficiency but can also make a worker so specialized in a narrow field that he is useless at anything else.

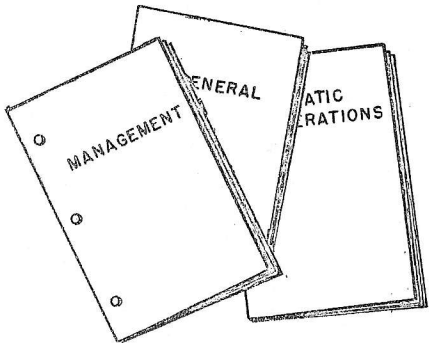
The assembly line of an automotive plant is an example. The worker stands in a set position, picks up a part from a fixed location and places it in a fixed location. He quickly develops a habit pattern of movement and works without thinking. Replace his bin of parts by a crate of apples and he will try to fit an apple onto the car. Put him on another job and he must be retrained.

RCEME workload does not lend itself to this degree of specialization but supervisors at all levels must recognize the value of habit and be continually watching for unsafe or inefficient work habits and methods. Method improvements must be introduced cautiously especially where a noticeable change in work habits is involved.

NEW

"MANAGEMENT"

PART IN THE EME MANUAL



The Static Operations part of the EME Manual details procedures to be followed and forms to be used in the operation of a RCEME workshop. The instructions in this part are directions as to the use of management tools. In many cases these procedures may not have been identified as management tools and the management principles behind them may not have been apparent.

It has now been decided to create a new part of the Manual called "Management". This part will deal with the more formal aspects of management and should help explain the reasons behind the Static Operation instructions. It is hoped that all levels of Management will come to recognize the management tools at their disposal and learn to use them effectively.

The first of these instructions - "Management E 010 - Work Study" has been written and is in process of publication. It is general in nature and will be followed by detailed instructions dealing with the sub-divisions of Work Study.

SERVICE IN UNEF

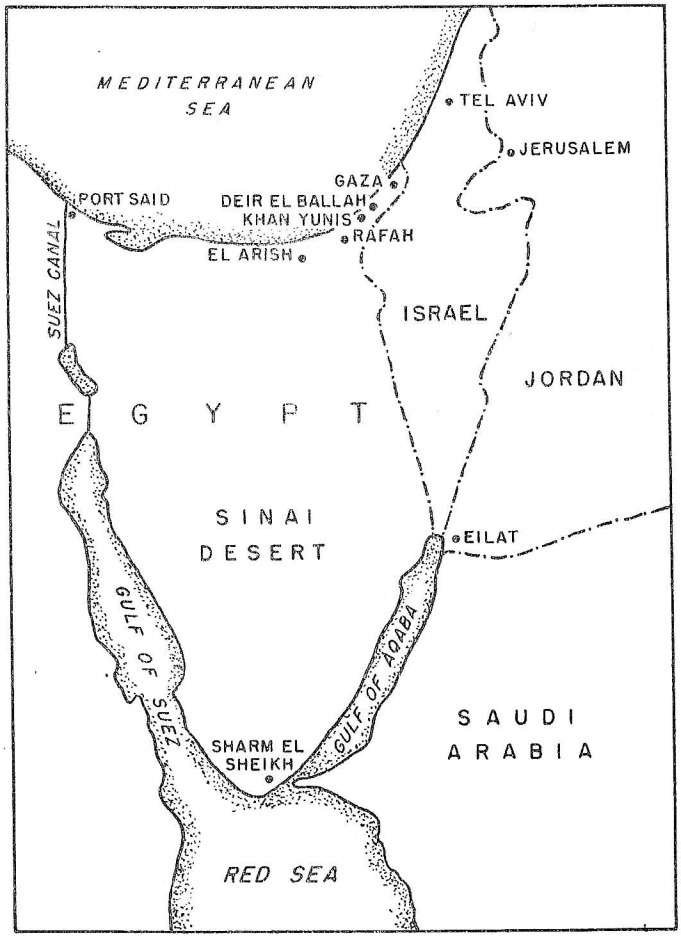
Major B Yarymowich

The emergency in the Middle East for which UNEF was created does not appear to be any closer to solution today than it was in 1956. As a result it is likely that many more RCEME officers and men will have an opportunity to serve here.

A posting to any of the Canadian units in UNEF is for a period of one year, but could be slightly shorter or longer dependent on the exigencies of the service. Families may not be brought to the Gaza strip, and no provision is made for soldiers to live out of camp for anyone bringing their families to the Middle East at their own expense. Rotation is on a man for man basis continuing throughout the year.

The country in the Gaza strip is gently rolling, fertile but very arid. However if irrigated it produces abundantly all kinds of subtripical fruits and vegetables such as citrus fruits, mangoes, bananas, dates, figs, pomegranates, almonds, peanuts and castor beans. The staple cereal grain is barley which is grown during the winter. Corn and watermelon are summer crops.

The Biblical city of Gaza is the largest city in the area but there are many smaller communities such as Rafah, Deir el Ballah and Khan Yunis.



The major industry is farming, but there are some handicraft industries also, such as leather work, shoe-making, weaving, and pottery manufacturing. The farmers may be fairly well-to-do landowners, who own the orchards and sell their produce, or the wandering Bedouin who subsists on his herd of sheep and goats and follows the rain and the pasture. He may plant crops but does not own land. His customs and dress are the same today as they were in the time of Jesus. His home is a woven goat hair tent. His means of transportation is the donkey or the camel. Trains, buses, and cars, however, are very plentiful and fares quite reasonable.

The climate is wonderful. The winter nights are cool but the temperature never falls below freezing, and the days are warm. There is a minimum of rain between the months of November and March, accompanied perhaps by sand storms. The rest of the year is continuously sunny with bright clear blue skies. In summer the days get extremely hot but the nights are somewhat cooler.

Camp Rafah, where most Canadians are posted, is situated about 1 1/2 miles from Rafah village which is about the same distance from the Mediterranean Sea. It is an old British RAOC depot with several large masonry warehouses and many smaller masonry buildings. The whole area is surrounded by barbed wire fence which is patrolled by a guard company.

The large warehouses are used as RCE and RCEME workshops, Ordnance Supply Depots, and Transport Garages. About 50% of the personnel are quartered in masonry huts, the balance in tent kits consisting of wooden walls and a tent and fly for the roof. Workshop personnel are all living in 4-man tent kits.

All work can be done in the workshop building which provides reasonable protection against the sun and some against the rain and sand. The roof still leaks somewhat but is in a much better state than it was when the first contingent moved in.

There is a reasonably good selection of machines and tools although we are not equipped to the lavish scale of our static workshop back home. The supply of spares is not consistent nor steady but with a bit of ingenuity the repairs get done. From October to April the workshop hours are 0730 to 1600 with an hour for lunch and in the summer from 0700 to 1300 with the afternoon and evenings free.

In addition to normal pay and allowances, and SFA if you are married, each soldier receives a special allowance of $30.00 per month, a foreign allowance depending on rank from $16.00 up, and a UN allowance of approximately $24.00. You may allow your pay to accumulate in your pay book, (except the special UN pay which is paid by UN and not by the Canadian Army), have it deposited in a bank, send it home by money order, or spend it.

Being on field service, clothing allowance is not payable, but free exchange of all clothing items worn here is permitted. Greatcoats are not required. Winter dress is battle dress tunic worn over bush pants and shirts except for walking out and parades, when full battle

dress is worn. Summer dress is bush pants and shirt or TW for walking out. Raincoats are very rarely needed except for warmth in the cooler evenings. Officers and senior NCOs are permitted to bring civilian clothing which is worn when off duty in camp or on leave. Winter suits are required but no top coats. Some warm sweaters are also necessary. All ranks may wear civilian clothes while on leave.

The facilities for recreation are in many cases somewhat primitive but fairly adequate. There are movies every evening of the week. Newly redecorated wet and dry canteens are available in various parts of camp. Cigarettes, beer, and other amenities are tax free. The workshop canteen is right beside the mens' tent lines and the mess hall. Cards, checkers, chess, darts, ping pong games, and pool tables are available. A fairly good library of hard cover and pocket books are available and a reading room is set aside for home newspaper and magazines. Camera equipment is cheap, and two camera clubs are in operation. There are many interesting subjects for both colour and black and white photography.

There is an incomplete gymnasium, horse shoe pitches, badminton and volleyball court, soccer fields and even a six-hole golf course with probably the best sand traps in the world. The beach is open daily during the summer months and transport is laid on for swim parades. Regular athletic and military competitions are held within the Canadian contingent and between contingents.

One-week leaves are granted every three months at either of the offical leave centres: Cairo from Oct to Apr, or Beirut from May to Sep. For these leaves, transportation, rations and quarters are provided in leave hotels at no expense to the individual.

In addition sightseeing tours are arranged to such places as Jerusalem and cities in the Holy Land, Alexandria, Ismailia and Luxor in Egypt and St Catherines Monastery in the Sinai Desert. These are at the expense of the individual.

On request and by priorities leave may be accumulated up to three weeks to go to Europe for which free transport is provided. Leave may not otherwise be accumulated.

Anyone planning to study for or write qualification or promotion exams, has an excellent opportunity. Most manuals are available. A training program both for trades and regimental upgrading and refresher training is also in effect and is working very well.

Taking everything into consideration a year spent with UNEF can be both an interesting and profitable one, and for those with bare chest the UNEF Medal (more affectionately known as the 'sand medal') is awarded to put some colour on your tunic.

FIELD WORKSHOP IN THE NUCLEAR BATTLE

by Capt HW Chapman

For the past few years the Canadian Army, in common with others, have been studying the problems of warfare under nuclear conditions or the threat of nuclear conditions. These studies resulted in the publication of the provisional pamphlet CAMT 1-8, The Infantry Brigade Group in Battle. Concurrent studies by DEME have indicated that a change in the RCEME field force organization is required to meet these new conditions.

The main consideration that indicates the requirement for a change is the time and space factor. In the extreme case under the zonal concept, the distance between units in the forward zone and the brigade administrative or logistics area may be 60-70 miles. The impossibility of backloading major equipment casualties to workshop sites in the administrative area and returning them to units quickly; the anticipated large increase in the number of major equipments that will accompany the further mechanization of the Army; and the tactical environment described in CAMT 1-8 all demand a reappraisal of our field repair system and organization.

During the brigade group concentration in 1959 and 1960 changes were made in the field workshop organization. If RCEME assistance is to be timely, then it must be readily available. If the equipment casualties, particularly major equipments, cannot be backloaded over long distance to RCEME, then the tradesmen must go to the casualty. This has resulted in the organization of a forward repair platoon (FRP) of the field workshop, to be located in the forward area of the brigade sector approximately five miles from main brigade headquarters.

Although superficially this appears to be the old AWD in disguise, such is not the case. The AWD was generally formed as required to move into a preselected location adjacent to a concentration of equipment casualties, and operated statically in the same manner as its parent workshop, usually until such time as the entire workshop occupied the site. The FRP however is basically a collection of radio-equipped mobile repair teams (MRTs) mounted in vehicles, and directed to the site of the equipment casualty for in-situ repair. The type of repair they perform will be limited generally to the simpler and faster type of field repair, normally by replacement of a major assembly.

These teams are radio-equipped for several reasons. The use of radio to order parts which were not known to be required when the casualty was originally assessed can do much to speed the repair, particularly if movement is restricted or prohibited during hours of daylight. It can be effective also as a method of directing a team from a completed repair job to another job in the same vicinity, and at the same time advise them of the time and place where a rendezvous can be made to pick up the necessary spare parts. A less obvious but important use for radio is to maintain contact with isolated teams in a fluid situation where units will be moving frequently.

The use of radio for notification of equipment casualties to the FRP will do much to speed up the repair system. Correct technical assessment by the LAD or unit tradesmen of the repairs and parts needed will be of the greatest importance if the full potential of the repair system is to be realized.

The suggested organization for a forward repair platoon shown below was used with some local modifications by the three field workshops in Canada during the 1960 brigade group concentrations.

FORWARD REPAIR PLATOON IN A FIELD WORKSHOP

SUMMARY

Offrs	1
ORs	58
MC	1
Trucks	20
Tlrs	11

Pl HQ

Pl Comd	Capt	1	
Veh Art	WO2	1	
Veh Art	Ssgt	2	
Clerk Adm	Cpl	1	
Veh Mech Wh	Cfn	3	
Dvr Wh	Cfn	3	
Dvr Radio Operator	Cfn	1	

Motorcycles	1
Truck 1/4 ton (W/RAK)	3
Truck 3/4 ton (W/RAK)	1
Truck Cargo 3/4 ton	1
Truck 3/4 ton (w/front mtd derrick kit 1500 lb)	1
Truck Rec Med 5-ton	2
Trailer 1/4-ton	1
Trailer 3/4-ton	1
Trailer 1 1/2-ton	1

Tracked Veh Repair Teams (6)

Veh Mech Tr NCO	1 (a)
Veh Mech Tr Cfn	3
Truck 3/4 ton w/winch (W/RAK)	1
Tlr 3/4 ton	1

Elec Repair Team (1)

Elec Art Ssgt	1
Elec Mech Cpl	1
Elec Mech Cfn	2
Truck 3/4-ton (W/RAK)	1
Tlr 3/4 ton	1

Wheeled Veh Repair Teams (4)

Veh Mech Wh NCO	1 (b)
Veh Mech Wh Cfn	3
Truck 3/4-ton (W/RAK)	1

Radio Repair Team (1)

Radio Art Ssgt	1
Radio Techn Cpl	1
Radio Techn Cfn	1
Truck Panel 3/4-ton (w/electronic repair adapter kit)	1
Tlr 3/4-ton (W/5KW Gen)	1

Notes: (a) two to be Sgts and four to be Cpls
(b) one to be Sgt and three to be Cpls
RAK = Radio Adapter Kit

The recommendations arising out of the employment of this organization by the field workshops should result in an improved version which can be incorporated in the workshop establishment.

The effectiveness of the FRP will be governed to a great extent by the system of spare parts supply which supports it. Although not shown in the FRP organization chart, because the spare parts platoon is on the establishment of the Ordnance Field Park, a spare parts stores section is an integral part of this organization. The SPSS should be relatively small in size and carry a range of replacement assemblies and associated spare parts. The emphasis must be on those spares required to effect the simpler type of field repair by assembly replacement. This SPSS normally will not support units or LADs in the brigade area.

Replenishment of spare parts will be from the brigade administrative area, thirty or more miles to the rear, brought forward by supply columns to a transfer point in the brigade area. The parts may be picked up at the transfer point by FRP representatives or RVs may be arranged for pick-up of specific items by the MRT awaiting the parts.

An important element of the FRP system for field repairs is the overall control exercised by the DADEME. The DADEME should be provided with radio and be located near the DAA&QMG in order that priorities may be established with the staff and problems dealt with swiftly. He will also control the demands made upon the FRP to ensure that they are in accordance with its designed capabilities, and ensure that the despatch and movement of MRTs is in accordance with the "G" plan, which may change quickly in a fluid situation. Present indications are that this location will be the forward logistic control headquarters.

(continued on page 8)

THE ARMOURED FIGHTING VEHICLE TECHNICAL STAFF

by Lt-Col RH Hodgson

The LAD and workshop officers' best friends during the Second World War were officers belonging to an organization known as the Armoured Fighting Vehicle Technical Staff, or simply the AFV Tech Staff.

The technical problems encountered by the LAD and bde workshop commanders could not always be readily solved by the technical publications at hand. In some instances, such as newly issued equipment, manuals were not available; or in many cases, the manual did not cover the type of problem encountered.

One of the best sources of information was the AFV Tech Staff. They visited the LADs and workshops about once a month or oftener if required and in many cases, being already familiar with the problem, they offered an immediate solution. These officers had a direct channel of communication to the Department of Tank Design (DTD), and sent copies of their reports to HQ 21 Army Group and CMHQ.

The Armoured Fighting Vehicle Technical Staff were formed to investigate the garbled reports on Allied and Enemy armour. The success of the AFV Tech Staff resulted in the formation of small units consisting of two officers and three men sparked by an intense curiosity and equipped with mobile camp equipment, cameras, a few instruments and the freedom to go anywhere in their theatre of operation, checking reports, examining captured enemy equipment and reporting on failures of allied equipment.

One of these groups, 1 CDN Sec AFV Tech Staff (Field Force), organized in 1944, was commanded by Lt-Col J R Johnson, RCEME [1] now Manager, Promotion and Development, Canadian Patents and Development Ltd. His second-in-command was Major A G Sangster, CAC, now Lt-Col, RCEME

On one of his first visits in the role of a roving technical staff officer, Major Sangster and his driver located a serviceable Panther Recovery Tank of the Pz KW V class. This was the first German ARV of this class to be seen and therefore would be of tremenduous interest to DTD. Authority was requested from 21 Army Group Rear via the cross-channel telephone to 'collect' the ARV from the Sherbrooke Regiment and to deliver it to UK. Authority was received to pick up the ARV and several other models too, including two Royal Tigers (Pz KW VI) which, up until this time, had not been encountered in the theatre. The request to 21 Army Group also brought forth a directive from General Montgomery's HQ on the use of the cross-channel telephone.

The following is a brief account of the 'collecting' of the Panther ARV and delivering it to the UK[2]. The ARV was picked up 6 Aug 44

Field Workshop in the Nuclear Battle (continued)

RCEME services must and can be developed and adapted to meet the changing condition of warfare visualized by the staff. However, our services must be developed within the frame-work of the logistic support system which as a whole is in a period of experimentation. We feel that we are on the right track and that refinements based on experience will result in maintaining the greatest possible number of equipments fit for operations.

from 2 Armd Tps Wksp at BENY-SUR-MER, where it had been delivered by The Sherbrooke Regiment's LAD and driven to JUNO BEACH. On the way, a hose in the power steering burst, leaving only manual steering in operation It also took some time to figure out the shift pattern for the transmission and this was further confused because second and third gear would not remain engaged -- thus it was necessary to shift from first to the fourth gear when ground conditions permitted. Col Sangster[1], in enlarging on his official report, said: "We had to drive through an ammunition dump on the way. It was here that I discovered that I couldn't turn to the left. In order to make a left turn, I had to back up using the right steering control, thus swinging the bow of the ARV to the left. In doing this we ran over and crushed a pile of boxed HE, which, fortunately for us, didn't explode.

"Finally we made the three miles to our rendezvous on the beach and within 300 yds of the awaiting landing craft we were immobilized when the journal at the front end of the propeller shaft became loose. With the aid of a bulldozer, the Panther ARV was pushed aboard and, as an extra, we were just about to push on a Pz KW IV, a German medium tank, which happened to be there, when a British officer came up and claimed the tank; so I boarded the landing craft and set off across the channel at 1200 hrs, 6 Aug 44".

The landing craft, LCT 442, developed engine trouble about halfway across the channel and had to slow down to half-speed, thus dropping to the rear of the convoy[2]. Fortunately, this mishap occurred at night. Early the next morning (0230 hrs) the LCT dropped anchor in THE SOLENT. Orders were received at 0700 hrs to stand by and await a tow." Col Sangster[1] enlarged on this by saying: "The LCT was quite unmanageable in tow, but the skipper finally beached her on the 'hards' at 1830 hrs after colliding with the tug and landing stage."

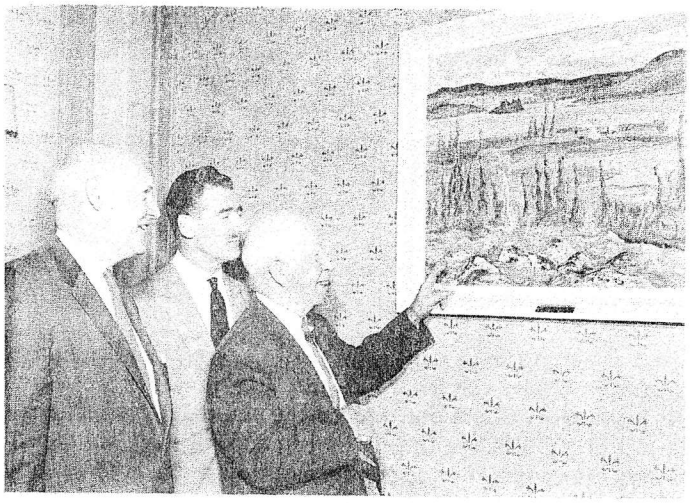
The Major and his driver had only a couple of sandwiches and their water bottle with them during this operation; thus, they were doubly delighted when the Panther ARV was unloaded and parked beside a pub. Unfortunately the pub was closed, having sold out their ration. "The RE captain in charge of unloading the LCT 'scrounged' us a bite to eat and some 'alkaline' tea", said Col Sangster[1]. "and I bedded down on one of those two-piece mild-steel barrack s beds, while my driver bedded down in the ARV as a security guard".

Major Sangster's troubles were not yet over. The following day was August Bank Holiday. He spent most of the day in vain telephoning the various duty officers in the War Office and the Ministry of Supply to have a transporter sent to pick up the Panther. "They were most cooperative, but unable to get a transporter for me that day", commented Col Sangster[1]. Finally, by deciding to take the 'direct' approach, he arranged for a transporter from the Proving Grounds at the Department of Tank Design. Major Sangster returned to France by air, just missing the Allied break-through. However, his efforts were not over-looked in the excitment, as General Montgomery's HQ found time to issue a directive regarding LCT hitch-hikers.

References:

[1] Lt Col A G Sangster - Letter to Lt-Col Hodgson, 29 Jul 60.

[2] Major A G Sangster - Report 97-2-2/CAC, Main HQ, 1 CDN Army, 14 Aug 44.



Col. R.A.Campbell, Maj.Gen.J.D.B.Smith, Dr.A.Y.Jackson

RCEME Officers Present Painting to AH2 Officers Mess - 27th. May 1960

The following is the text of the address given by the Director, Col. R.A. Campbell, at the presentation ceremonies:

General Smith, Distinguished Guests, Ladies and Gentlemen. This evening I am pleased to represent RCEME on this particular occasion. The officers in RCEME sometime ago made a donation for a gift to the Army Headquarters Officers' Mess. This gift has been sometime in coming but I believe that the waiting period has been worthwhile. We explored many possibilities but when we were fortunate enough to have an entree to Dr A Y Jackson, through Major Ellis, and particularly fortunate to get Dr Jackson's agreement to paint a picture for us, the final decision was easy. I need not elaborate on Dr Jackson's background because I feel that it is enough to say that he is one of Canada's famous "Group of Seven" artists. Dr Jackson has a great love for the outdoors and in particular the savage rugged character of the Northland. Last Autumn Dr Jackson made a trip to the area around Great Bear Lake in the North West Territories where he made sketches in and around Port Radium, the location of the original Eldorado Mine located at the east end of Great Bear. These sketches were made for the officials of the Eldorado Mining Company but again, we were fortunate that Dr Jackson was able to get a release of one of this series of sketches for us. To-night, we have the painting from this sketch that he made last Autumn.

This painting has special significance to the Army for a number of reasons. The first of these reasons is that Dr Jackson himself served the Canadian Army in World Wars I and II. First as a soldier and later as an artist. As a soldier he was wounded in France in 1916 and while on convalescent leave in England, he was introduced to Lord

Beaverbrook. Lord Beaverbrook was responsible for his receiving an Army commission and being designated a War Artist. During this same period of convalescence, the well known and frightful battle of Paschendale was fought, which Dr Jackson missed, and perhaps missing this one event, gives us this picture today. During the Second World War, he was largely responsible for the silk screen reproductions of Canadian paintings which were widely distributed to camps and barracks, to brighten the otherwise rather drab surroundings.

It is significant also that the Canadian Army played a major part in opening up the particular area around Port Radium portrayed in this painting through the Army's North West and Yukon Territory Radio System. Port Radium was also the first established settlement contacted by the moving force of Exercise Muskox on re-entering the tree line area after the trip over the barrens of the North from Fort Churchill in 1946. This last event adds a little RCEME interest because Col Sangster was the RCEME officer on this trip.

You will now conclude that this picture can conjure up thoughts of two great wars, a famous Canadian War artist, the Army's role in opening up this part of Northern Canada with a slight RCEME touch. It is my great privilege and pleasure to present this picture to you, General Smith as Commanding Officer of the Mess, on behalf of all the RCEME officers in the Corps."

"I want to thank those officers who responded to my appeal for a $1.00 contribution some months ago in order that we might present a gift to the Army Headquarters Mess on behalf of RCEME. I also wish to acknowledge a special gift from the following senior serving RCEME officers for their special contribution which made up the difference between the amount collected and the cost of this painting:

Brigadier JW Bishop
Colonel JR Dunlop
Colonel RL Franklin
Colonel EC Mayhew
Colonel KH McKibbin"

(RA Campbell)

TRANSPORT OFFICERS' CONFERENCE

by Maj CG Racicot

(The following article was written by Major CG Racicot and describes a procedure used by him at Camp Borden. The Director urges Camp and Garrison EMEs to institute a similar system of liaison.)

It has been found that one of the best ways to ensure efficient service and good results with units is by constant liaison. It is, however, extremely time consuming for a Camp EME to visit all units regularly. Normally, units are not visited too often in a year.

To alleviate this lack, it was thought advisable to conduct a monthly conference of all Camp Borden Unit Transport Officers, chaired by the Camp EME. The conference is held on a regular basis on the first Wednesday of every month. It provides the opportunity to discuss:

a. E & ME services provided during the previous month.

b. Problems arising from these services.

c. Provision of further E & ME services.

d. Means to increase efficiency.

e. Generally, transport operation in a unit.

In addition to the Transport Officers and the Camp EME, a spare parts representative from RCOC and the control and production officers of the workshop attend the meeting to answer questions relating to problems which have arisen during the previous month, both in the spare parts and the workshop repairs field.

The unit Transport Officers are also requested to contact their QMs before coming to the conference in order to bring the details of problems concerning the repair of technical equipment other than vehicles. These are also discussed and settled at the conference.

To be of practical use, all problems are treated specifically as opposed to generally. Transport officers are requested to bring actual CAR numbers, 2149 numbers and even part numbers; as a result the details of the problem are discussed and settled right there with all parties concerned. Decisions within the domain of the Camp EME are given at this conference.

Minutes of these conferences are always prepared and forwarded in duplicate to the units concerned; one copy for the unit CO and one copy to be held by the Transport Officer concerned. In addition, the DAQMG and the Command EME are given information copies of these minutes.

The system was instituted in Camp Borden 4 Nov 59. So far, unit COs are very pleased with it and have stated that it keeps many detailed problems away from them and provides a very effective liaison between the RCEME workshop and their units.

DEVELOPMENT OF STANDARD REPAIR TIMES

by Maj BB Cox

During the past, management has generally relied on historical records and statistical data as a means of determining the effectiveness of repair and maintenance, and in setting of suitable standards. That is to say, the average time taken to carry out any function has generally been considered a suitable standard.

Early in 1959, it was decided to develop Engineered Standards (Standard Repair Times) in order to provide management with the basic information necessary, on which planning and scheduling of the productive effort could be based.

To this end, Maintenance Techniques Section was assigned the task of establishing Standard Repair Times for current SMP equipments, newly developed equipments adopted by the Army and equipments under development for the Army.

DEFINITION

Standard Repair Times (SRT) as referred to in this article, are the times required to perform a repair operation, using trained tradesmen working at a normal pace under typical workshop conditions. They include only the time to perform the actual repair operation. Time to obtain tools, parts and/or information, break periods, etc, are not included. These latter are variables, and subject to change in each workshop due to geographical location, accommodation, etc.

PROCEDURE

In the process of developing or setting standards, it is generally necessary to establish the correct method by conducting a Work Study or Method Study, followed by some form of Work Measurement such as Time Study, using a stop watch to record as accurately as possible the time to carry out a given activity, or by using Predetermined Motion Time Standards.

The development of Standard Repair Times by Maintenance Techniques Section is based on conducting time studies, using a stop watch, and employing the repair method authorized by EME Manuals in the xy3 or xy4 series, or in their absence, by reference to authorized publications, normally in the xy0 series. If in the course of the study an improved method is developed, it is submitted in detail for inclusion in the appropriate EME Manual. Only the tools and equipment authorized for the particular repair echelon are used, since differences in tooling at the various echelons may well result in difference in time for a given operation.

The MTS in 204 Base Workshop have completed SRTs on the Truck 1/4 ton, 4x4 M38 and M28A1, the Truck 3/4 ton, 4x4 Dodge, and the Carrier, Cargo, Articulated (RAT). Equipments remaining to be covered are:

Truck 2 1/2 Ton 6x6 GMC (SMP)

Truck 5 Ton 6x6 (SMP)

Car, Scout, Ferret Mk 1

Trailers, Laundry and Bath

Motorcycle, Triumph TWR.

In Montreal, MTS is carrying out the preparation of Standard Repair Times on the Centurion, and on Armament and Small Arms equipments. Progress to date is as follows:

Centurion Mk 5	- 50% complete
Air Compressor (Broomwade)	
Rifle, 7.62 MM FN (C1)	- 50% complete
Rifle Automatic 7.62 MM (C2)	- 50% complete
Gun Machine, Browning Cat 30 M1919A4	- complete
106 MM Rifle M40A1 and Mount M79	- 20% complete
Tripod, Browning Machine Gun Cal .30, M2	
Rifle "C" No 7 .22-in Mk 1	- complete
Gun Sub Machine 9 MM (C1)	
Pistol, Browning FN 9 MM HP	- complete
Mortar, 81 MM, M29, Cdn	- complete
Mortar, 4.2-in M30	
Launcher Rocket 3.5-in M20A1 and M20A1 Cdn	- complete
Launcher Rocket 3.2-in Cdn C1	- complete
20 Pr Tank Gun Equipment	- 40% complete
105 MM Howitzer M2A1 and M2A1 Cdn	- 20% complete
105 MM Howitzer M1A1 Cdn on Carriage M1A2	- complete

On more complicated equipments as many as ten determinations are taken on equipments selected at random, in various classes of condition, by various teams of tradesmen both civilian and military. The final SRT is based on the mathematical average of the times recorded, adjusted where applicable to compensate for the varying skills of the tradesmen, and the varying condition of the equipment used. In the latter case, variations in time are known to have resulted from rusty bolts, broken studs and parts frozen together, etc. With very few exceptions time studies are conducted on used equipment.

The following examples indicate the necessity of making adjustments for tradesmen's skill, and abnormal conditions.

EXAMPLE

3/4 Ton 4x4 Dodge

LEGEND

R - Replace

Component Assembly or Part	UNIT	LAD	FIELD	BASE	Repair Times. - Hours and Minutes										
					1	2	3	4	5	6	7	8	9	10	SRT
Pulley - Crankshaft			R(E)	R	.56	1.00	1.40	1.30	1.15	1.00	1.54	1.06	1.47	2.00	1.15
Remarks - Time in Column 7 was excessive due to damaged crankshaft threads. - Time in Column 10 was that of a Gp 1 tradesman. The mathematical average (not adjusted) 1 hr 25 mins (adjusted time) 1 hr 15 mins															
Core Speedometer drive shaft		R	R	R	.15	.15	.15	.15	.15	.20	.16	.24	.15	.15	.15
Remarks - Time in Column 8 was excessive due to kink in the cable. The mathematical average (not adjusted) 16 1/2 mins (adjusted time) 15 mins															

In passing, it is worth mentioning that industry in general has found the area of repair and maintenance one of the most difficult in which to establish reliable engineered standards, primarily because of the variety of factors involved.

The method employed by MTS is considered reliable; however, it requires constant checking both at the development and working level. Obviously work measurement based on the time study method can be only as accurate as the application of the Standard. In other words, application of wrong data, or the omission of any elements, will give a wrong answer in performance.

In addition this type of data must be constantly revised to keep up with improvements in methods, tools and materials all of which will ultimately affect the data developed.

TOOL DEVELOPMENTS IN RCEME WORKSHOPS, PART 2

This is the second in the series of articles on tooling and technological developments and covers a review of tool evaluations as it concerns our workshops.

EVOLUTION OF TOOLS

It is not too many years ago that machine tools were driven from overhead countershafts, a number of countershafts being driven from a single high horsepower motor. Each machine had its own step or coned pulley driven by a flat leather or fabric belt. To change speed, the belt from the countershaft pulley was rapidly thrown up or down the various steps of the coned pulley; many of our old-time tradesmen were very adept at this. Coned pulleys and countershafts have gradually disappeared.

First the countershafts were moved down from the ceiling and mounted on auxiliary brackets or on the machine itself and individual motors were used for each machine. Later the coned pulleys moved into the machine proper and were ultimately replaced with V belts on variable-speed pulley drives.

Almost all of these coned pulley drive type of machines have disappeared with the exception of a few types such as the South Bend Lathe still in some workshops. The machines themselves, however, developed more slowly, in fact, some manufacturers produced a basic machine back in the early Ninetween Hundreds and continue to manufacture the same basic item to this day. Of course, modifications have been carried out to these machines to permit speed changes, etc, but certainly many of the original patterns continue to be used.

DEVELOPMENT OF SPECIFIC MACHINES

LATHES

Lathes as a whole have developed reasonably fast from the coned pulley with its countershaft drive, development has now progressed to the gear headed lathe. Left hand types (where the carriage hand wheel was at the right hand) have disappeared. Quick change gear boxes are standard on all lathes. In fact, we no longer teach our tradesmen how to calculate the gears necessary to give a certain lead or thread. Changes from metric to conventional threads are now carried out with a flip of a lever. Flame hardened ways or hardened way inserts are now appearing as standard. The threaded spindle nose has changed to the cam lock type. Steady rests with rollers are appearing instead of the solid type of jaws; even the tail stock itself with its wrench and nut tightening method is being replaced by single lever cam tightener. In fact, some of the new machines in the low-priced field are competing with the infinitely variable speed type of lathe such as the Monarch, and most of the "Automatics" now show speed readings directly in surface feet per minute. In addition, air tracer equipment to permit rapid duplication (profiling) of parts from a master or template is coming more and more into use. A Monarch Model 10E with air tracer attachment was recently installed in 202 Base Workshop.

Many of these features, if not all, have been available for a good number of years but, however, like having automatic transmission in your car in 1937, you could have it if you paid the money, they were not economically practical for RCEME workshops. A Cincinnati Hydra Shift, incorporating most of these features was recently purchased and installed at 202 Base Workshop.

On this lathe the operator selects spindle speeds by rotating a dial on the headstock and machine itself functions hydraulically to change to the RPM selected. This machine however, is untried for Army use and has been sent to the Base Workshop with the idea that they will work it hard and so prove its worth or otherwise. This type of lathe could well be the standard workshop lathe a few years hence.

Ten other new lathes but of lower cost have recently been purchased for the RCEME School. These are "Cardiff Model SS and SC, having a 15 inch swing and 40 inch centers, they are gear headed with tray top construction and of the cabinet type base. Speed selection is by colour coded levers to permit easy identification of speeds. This machine is also equipped with a reversible lead screw and a removable gap bed. It can cut most of the common threads as well as metric. Some of the reasons for a choice of the above machine for our School were as follows:

a. Tray top allows tools to be kept on the headstock rather than the ways, a common practice by untrained personnel resulting in damage to the ways.

b. The colour coded gear selectors will permit personnel not familiar with the machines to select speeds rapidly.

c. The lead screw is used only for thread cutting and is reversible; this permits it to be turned end for end should wear occur after a few years. Longitudinal and cross feeds are provided by a separate feed rod.

d. The removable gap, of course, allows normal small diameter turning while at the same time permits the machine to swing larger diameters when required.

SHAPERS

Shapers have developed at a much slower rate but are moving from mechanical to hydraulic operation; this gives smoother performance, quieter operation, etc. Traverse mechanisms have been streamlined, but other than this mechanical shapers remain much as they have for the last twenty years.

SAWS

Saws have developed from the simple reciprocating hacksaw to the horizontal band saw. This, of course, saves time in that there is no waste motion in the movement of the saw blade itself and the increased length of the saw blade increases its life. As an example, the band saw blade as used on our standard models should last two or more weeks of normal cutting. They also give a thinner cut, and pressure on the blade being controlled hydraulically, keeps blade breakage to a minimum. In addition, workshops have been supplied with portable Hand-I-Hacks. This is a small reciprocating saw weighing about 15 pounds which can be clamped to a length of stock, can saw in any position and will automatically shut off on completion of its cut.

In the woodworking field we have moved to the Radial or overarm type of saw. This saw is more versatile and easier to handle than a circular saw, in the "cut-off" position the wood is held steady and the saw itself moves in full view of the operator. It requires far less working space than a circular saw, as a result, carpenter space in RCEME workshops can be reduced to an area 10 feet by 30 feet.

Incidentally, this saw is now considered a workshop tool rather than a carpenter tool and regardless of establishment will be on issue. Other tools in this shop are restricted to a portable power saw, a portable belt sander and a carpenter's tool kit. Some workshops continue to carry out RCOC repair functions on furniture, dunnaging, crating, etc, and are authorized to hold additional machinery.

WELDERS

DC types of welders are of course common. Many workshops have been issued with the "Miller" rectifier type Arc welders which can be adapted to heliarc or other types of gas shield arc welding. Hard facing guns are being supplied to certain workshops supporting engineer units. These guns permit automatic application of hard metals on such things as 'dozer and grader blades, track rollers, etc.

Several Arcair torches have also been provided to simplify the preparation of components for hard surfacing. This torch cuts by means of an electric arc with a high velocity jet of compressed air to blow away the molten metal, leaving a clean even surface which requires no further preparation for welding. A concentric air/power cable supplies compressed air to the torch which is fitted with an air control valve; a self-aligning rotating jet permits the copper coated carbon graphite electrode to be adjusted to any angle. It is simple to operate, can be used with any DC arc welder and will gouge, cut or bevel mild steel, stainless steel, hard alloys, brass, bronze, monel, cast iron, or any other metal.

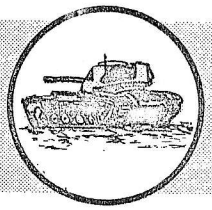
WHEEL ALIGNMENT

Wheel alignment pits are to disappear by evolution. Here, however, we are not advancing technically but rather revising our requirements. Originally this pit was provided for frame straightening and in addition was "convenient" for wheel alignment. However, alignment can be carried out by portable or on-the-floor type of equipment; frame straightening, on the other hand is rarely resorted to, and with a few exceptions can be carried out by civilian contract.

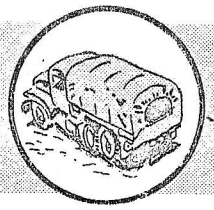
GREASING

Grease pits, as such, have long since disappeared except for a few in old buildings rapidly moving into disuse. Twin-post hoists have replaced these pits and now overhead reel-type lubricating equipment of the pull-down-hose type is to be supplied to all "Standard" workshops. Later perhaps all workshops will be so equipped.

The next article in this series will deal with the development of the balance of equipment used in RCEME Workshops.



Technical Section



Inspector RCEME Says:

All static companies, less No. 1 Company, were visited by Inspector RCEME. Of those inspected 3 Company RCEME is rated the best.

It is impossible to select a best workshop but the following were rated as being in the "best" category:

208 Workshop Ottawa
210 Workshop Picton
216 Workshop Chilliwack
224 Workshop Edmonton
229 Workshop Wainwright

We hope to see more workshops in the "best" category on the next inspection.

Parts Supply
Trade References

RCEME Workshops have reported difficulties in determining Canadian Suppliers and agents for US Firms. This has resulted in delays in the procurement of spare parts.

The information is published in Fraser's Canadian Trade Directory and is available from DDP district offices. Current volumes are also held at CODs.

This reference material is usually only required in exceptional cases, therefore distribution at lower level will not be made. Any such information can be obtained through RCOC channels from the COD's and DDP district offices.

Upgrading Training
Group 1 to Group 2

The Inspector RCEME visits have disclosed that some units were not fully aware of the current system of upgrading training.

For some time now all graduates of Group 1 courses at the RCEME School have been posted to 202 or 204 Base Workshop for in-job training and trade test to the Group 2 level. Vehicle mechanics wheeled and body repair men are trained at 204, other trades at 202.

A variation of this system is found in the radio, radar and FCS technicians trades, in which training to Group 2 level is given at RCEME School.

The combined effect is to provide speedy upgrading and equitable opportunity for Group 1 tradesmen and to make it possible to post Group 2 tradesmen to RCEME units providing services direct to user units.

Test Equipment

Further to the standardization mentioned in previous issues of this bulletin, the following items are available or out to contract.

a. 6625-21-478-0329 BRIDGE, C-L-R, ZM-11/U.

This item is used for checking capacitors, resistors, inductors and transformers. It will supersede the BRIDGE capacity and resistance, Clough-Brengle Model 330A and 230.

b. 6625-21-478-0379 GENERATOR, signal, TS-382F/U.

This is a portable, general purpose oscillator which provides a sine wave output over the frequency range 20 to 200,000 cps. It will supersede the GENERATOR, signal, AF/RF, Waveforms Inc Model 510B.

c. 6625-21-101-4677 GENERATOR SET, signal, RF, AN/URM-26.

This is an AM generator which covers the frequency range 4 to 405 mc. It will supersede the GENERATOR, signal, RF, Adv Comp Type D1.

d. 6625-21-106-2464 MULTIMETER, ME-77A/U.

This is a rugged, general purpose multimeter which will supersede most of the multimeters in current use. The 6625-21-106-2465 MULTIPLIER, electrical instrument, MX-1472 A/U and the SHUNT, instrument, multirange MX-1471 A/U are used in conjunction with the ME-77 A/U to extend its facilities.

e. 6625-21-101-9968 MULTIMETER, TS-505 B/U.

This is a portable, vacuum tube voltmeter and DC ohmmeter. It will supersede the TEST SET, radio, Stark Model VT-9A.

f. 6625-21-104-4814 OSCILLOSCOPE, OS-8D/U.

This item is the same as the OSCILLOSCOPE, OS-8B/U except the vertical amplifier frequency response has been extended to 4 mc The OS-8D/U runs warmer than the OS-8B/U because of the greater power consumption caused by the additional tubes in the vertical amplifier ckt.

g. 6625-21-101-9923 POWER SUPPLY PP-351/U.

This is a portable, voltage - regulated supply used to provide "A", "B" and "C" voltages for specification testing tactical radio equipments.

In the process of introducing new equipment into the Canadian Army, entitlement action must be taken. Therefore, equipment tables, EIS's, etc, are amended before the new equipment is available. To eliminate confusion, the field will be notified in the future of the changes and the characteristics of the new equipment either by letter or through the medium of this bulletin.

When an item is selected as standard, it is not possible to buy in quantities sufficient to cover all demands. The first buy is normally made to cover the requirement of the field forces and small quantities for the RCEME School and 202 Base Workshop. Equipments falling in this category are the ZM-11/U, the TS-382F/U, and the AN/URM-26B. When these are received off contract, units to be equipped will be notified. This will prevent other units from indenting for the new item and perhaps receiving an in lieu item which the unit already holds.

Whenever possible manuals will be issued at the same time as the equipment.

Unlisted Tube Types

The following information is provided pending official publication of data on unlisted tube types for the TEST SET, electron tube, TV-7C/U.

Type	Fil	Selectors	Bias	Shunt	Range	Press	Min Value	Notations
CV73	4.3	FU-2-0760	40	-	C	3	50	Top cap connects to plate. Use adapter for British tubes
CV140	6.3	ET-0-2050	-	70	A	2	40	Diode #1
CV140	6.3	ET-0-7010	-	70	A	2	40	Diode #2
CV468	6.3	GT-1-8070	28	-	D	3	28	Use flying lead adapter E-104
CV1072	4.3	ET-0-0000	-	55	A	7	40	Use adapter for British types
CV1101	6.3	HS-0-3080	22	-	D	3	16	Top cap connects to grid triode section
CV1101	6.3	HS-0-4080	-	15	A	2	40	Diode #1
CV1101	6.3	HS-0-5080	-	40	A	2	40	Diode #2
CV1102	6.3	HS-5-6080	37	-	C	3	40	Triode #1
CV1102	6.3	HS-0-3040	37	-	C	3	40	Top cap connects to grid triode #2
CV1574	6.3	JR-0-3425	12	-	D	3	25	Top cap connects to grid
CV1581	6.3	HS-5-3486	16	-	C	3	18	Hexode section top cap connects to grid

Type	Fil	Selectors	Bias	Shunt	Range	Press	Min Value	Notations
CV1581	6.3	HS-5-6483	26	-	C	3	16	Triode section
CV1865	6.3	FU-1-8030	22	-	C	3	42	
CV1989	6.3	ET-0-2050	-	70	A	2	40	
CV2135	6.3	FU-2-7839	24	0	B	3	28	
CV4040	6.3	ET-1-5720	32	0	C	3	42	
CV4061	1.5	ER-0-0000	0	51	A	4	40	Use adapter E104 terminals #1 and #4 top lead connects to plate
CV4062	6.3	ET-1-5722	32	0	D	3	28	

VEHICLES

Inspection of Engineer Equipment

At the request of the Directorate of Works, all holdings of engineer equipments are to be inspected annually, effective immediately. EME Manual Veh A 103 Instr 1, will be amended in due course.

Engine Repairs

1. There appears to be some confusion between the PRSs and EME Manual Veh X004 Instr 2.

2. The PRS is prepared initially for wartime application and is subject to variations when applied to static operations.

3. Specifically the PRS limits field workshops to re-ringing in an emergency only, while Veh X004 Instr 2 requires the workshop to re-ring, rather than backload.

4. In static workshops Veh X004 Instr 2 will take precedence over the PRS in so far as engine repairs are involved.

who's where

NOMINAL ROLL WARRANT OFFICERS

Class 1

Anscomb	GW	5 Coy RCEME
Baynes	CH	1 Fd Wksp
Beddows	RS	The RCEME School
Boshier	R	8 Coy RCEME
Brennan	RS	The RCEME School
Brown	AT	18 Coy RCEME
Brunton	AC	2 Fd Wksp
Buck	WM	14 Coy RCEME
Churchill	CA	ADE
Clarke	DL	4 Fd Wksp
Conway	RF	16 Coy RCEME
Cozens	SD	The RCEME School
Dillon	TF	ADE
Dodds	TH	The RCEME School
Dudley	J	Br of AG (D Org)
Fernets	JM	202 Base Wksp
Fox	HR	DEME
Gallier	H	The RCEME School
Gladwin	CH	COA 1 Staff
Gray	P	DEME
Greenham	IL	6 Coy RCEME
Guilfoyle	ME	LdSH (RC) LAD
Hayes	JW	DEME
Henry	JE	FGH LAD
Houlton	VH	DEME
Hunder	BAJ	The RCEME School
Hurd	LR	202 Base Wksp
Jackson	O	10 Coy RCEME
James	JW	RCAC School
Kaufman	DC	202 Base Wksp
Keech	HL	DEME
Kennedy	HG	16 Coy RCEME
Knight	RA	Que Comd I Staff
Knowles	GA	Inc D Fd Wksp
Langford	WH	2 Coy RCEME
Lawson	RW	10 Coy RCEME
Leach	FH	AHQ C&D Estb
Leon	BU	16 Coy RCEME
Leonard	WV	14 Coy RCEME
Lewis	SM	8 Cdn H LAD
Longley	GM	12 Coy RCEME
Lowry	LH	DCER
MacDonald	DJ	DEME
MacDonald	J	The RCEME School
McCague	LT	204 Base Wksp
McInnes	DM	10 Coy RCEME
Meloche	JR	4 Coy RCEME
Mercer	JL	The RCEME School
Neil	T	11 Coy RCEME
Norbury	G	13 Coy RCEME
Owen	LR	7 Coy RCEME
Parker	JC	204 Base Wksp
Patterson	DJ	CADEE
Richardson	W	202 Base Wksp
Rivers	AM	3 Coy RCEME
Riley	GA	DEME
Robertson	WG	DEME
Rowe	AW	The RCEME School
Shaw	JE	3 Fd Wksp
Sherman	CG	DEME
Sinclair	L	DEME
Snell	JD	ADE
Spackman	JH	RCSA
Tatham	J	11 Coy RCEME
Thivierge	AJ	ADE
Turner	CM	ADE
Turner	E	ADE

Class 1

Venus	AJ	ADE
Walsh	IS	56 Cdn Inf Wksp
Warren	DH	202 Base Wksp
Weston	ET	RCD LAD
Wilkinson	EJ	202 Base Wksp
Young	RD	6 Coy RCEME

Class 2

Adams	RMJ	204 Base Wksp
Allen	EB	4 CIBG LAD
Allen	WG	18 Coy RCEME
Almey	B	DEME
Ambler	J	2 Fd Wksp
Anderson	JS	202 Base Wksp
Anderson	SB	1 Fd Wksp
Armstrong	JH	ADE
Axford	DS	DEME
Bailey	E	204 Base Wksp
Balmer	AJ	5 Coy RCEME
Barrett	S	2 Coy RCEME
Barrey	WGA	202 Base Wksp
Boisvert	L	5 Coy RCEME
Both	TA	6 Coy RCEME
Bottle	DA	2 CIBG LAD
Bouchard	JM	56 Cdn Inf Wksp
Bougie	I	202 Base Wksp
Brooks	LF	2 Fd Wksp
Broomer	TF	4 Coy RCEME
Brown	AW	3 Coy RCEME
Burgess	EW	3 CIBG LAD
Burnett	JH	4 Fd Wksp
Byer	DE	7 Coy RCEME
Campbell	DN	The RCEME School
Cassidy	GP	The RCEME School
Champagne	DJ	202 Base Wksp
Chisholm	LF	6 Coy RCEME
Christensen	AJ	202 Base Wksp
Clarke	DC	13 Coy RCEME
Clyde	KT	204 Base Wksp
Cochrane	HM	DEME
Coles	JC	16 Coy RCEME
Colson	AR	3 Coy RCEME
Coughlin	AF	202 Base Wksp
Crane	CE	The RCEME School
Cross	FT	204 Base Wksp
Cunningham	JM	2 Fd Wksp
Dainty	HW	8 Coy RCEME
Dance	GN	The RCEME School
Dand	RJM	13 Coy RCEME
Davies	JS	The RCEME School
Davis	FAE	11 Coy RCEME
Deans	AG	4 Fd Wksp
Dew	AE	10 Coy RCEME
Dewar	J	DEME
Doherty	E	202 Base Wksp
Doherty	SF	202 Base Wksp
Dorey	EE	RCD LAD
Dormer	NH	3 Fd Wksp
Drake	EA	6 Coy RCEME
Drew	CV	ADE
Drobot	W	HQ RCEME Que Comd
Duncan	FP	1 CIBG LAD
Elliott	JR	10 Coy RCEME
Elliott	WEC	1 RCHA LAD
Evans	RT	11 Coy RCEME

Ewert	CD	3 CIBG LAD
Fairbairn	TM	10 Coy RCEME
Feller	DH	4 Coy RCEME
Ferguson	HG	4 CIBG LAD
Foley	HEF	3 RCHA LAD
Ford	RC	1 CIBG LAD
Ford	RLC	14 Coy RCEME
Fryer	JWA	56 Cdn Inf Wksp
Gavriloff	W	CADEE
George	AG	4 Coy RCEME
George	LJ	2 CIBG LAD
Gibbs	BF	3 Fd Wksp
Gill	DE	DEME
Given	RJ	204 Base Wksp
Goss	RB	1 RCHA LAD
Graham	AA	13 Coy RCEME
Graham	JC	3 Coy RCEME
Gribble	DL	3 Coy RCEME
Griffin	GW	3 Coy RCEME
Gunn	WH	11 Coy RCEME
Halliday	AG	202 Base Wksp
Hammond	GT	ADE
Hanash	J	10 Coy RCEME
Hardy	JR	3 Fd Wksp
Harper	JM	56 Cdn Inf Wksp
Harvey	LM	C&D Estb CAS(W)
Hawton	HW	204 Base Wksp
Healy	TW	202 Base Wksp
Henderson	KW	D Pers
Hewison	RW	3 Fd Wksp
Hicks	AL	6 Coy RCEME
Hinton	WG	The RCEME School
Hirsch	AL	8 Coy RCEME
Hooper	TC	10 Coy RCEME
Hutley	HA	14 Coy RCEME
Isaac	AW	5 Coy RCEME
Jackson	AF	C&D Estb AHQ
Janssen	MEJ	2 RCHA LAD
Johnson	GM	3 CIBG LAD
Johnson	WA	7 Coy RCEME
Johnstone	T	204 Base Wksp
Joyner	EF	CADEE
Kayne	HG	Incr 'C' Fd Wksp
Keating	EA	56 Cdn Inf Wksp
Kelly	MP	12 Coy RCEME
Keogan	MJ	1 Fd Wksp
Kirkpatrick	AM	8 Coy RCEME
Knox	CD	202 Base Wksp
Kraemer	KE	The RCEME School
Lasuta	W	8 Cdn H LAD
Lauret	JE	4 Fd Wksp
Lawrence	BJ	4 CIBG LAD
Lee	KA	The RCEME School
Legg	FG	2 Fd Wksp
Leon	GR	1 Fd Wksp
Lewis	CB	11 Coy RCEME
Lindsay	GA	204 Base Wksp
Little	JE	202 Base Wksp
Low	GA	202 Base Wksp
MacDonald	CW	10 Coy RCEME
Macklaine	WB	1 Fd Wksp
MacLellan	EB	202 Base Wksp
MacLeod	D	DEME
MacPhee	DM	4 Coy RCEME
Maguire	GK	DEME
Mahood	NEH	Incr 'D' 1 RCHA
Main	T	1 Fd Wksp
Mallett	JG	202 Base Wksp
Marston	CV	HQ RCEME Wescom
Mason	J	2 Fd Wksp
Maw	A	204 Base Wksp
Maxwell	AC	11 Coy RCEME
McBlane	AG	Alta Area I Staff
McCaffrey	LE	2 Fd Wksp
McDonell	AP	4 Fd Wksp
McDow	KA	2 CIBG LAD
McElroy	JC	3 Fd Wksp
McGovern	PMJ	DDD
McIntyre	WA	2 Fd Wksp
McLeod	HAT	The RCEME School
McLeod	LF	HQ RCEME Eascom
McLeod	MH	DEME
McMurchy	WS	202 Base Wksp
Melvin	GR	1 Fd Wksp
Milne	HC	202 Base Wksp
Moore	WE	10 Coy RCEME
Myatt	WC	4 Fd Wksp
Myrtle	PG	2 Coy RCEME
Nelson	EC	COA I Staff
Newberry	RJ	202 Base Wksp
Nicolson	A	10 Coy RCEME
Oakes	GAM	202 Base Wksp
O'Grady	CL	4 Fd Wksp
Patterson	MP	204 Base Wksp
Peacock	GG	DEME
Pennie	FM	11 Coy RCEME
Perrin	WG	The RCEME School
Pineo	MC	11 Coy RCEME
Press	J	CADEE
Price	EC	3 Fd Wksp
Proud	VS	204 Base Wksp
Rawling	GW	D Pers
Reid	J	DEME
Reimer	JJ	13 Coy RCEME
Reynolds	GA	4 Coy RCEME
Rhodes	AP	204 Base Wksp
Robertson	DW	3 Fd Wksp
Roche	WD	202 Base Wksp
Rochefort	EA	202 Base Wksp
Rodd	FL	DEME
Rose	AG	4 RCHA LAD
Russell	MM	13 Coy RCEME
Rutherford	FA	13 Coy RCEME
Sambrook	JV	DEME
Schleihauf	GH	202 Base Wksp
Sedger	CA	11 Coy RCEME
Seeley	HR	HQ RCEME Cencom
Seguin	RH	DEME
Silzer	J	7 Coy RCEME
Simpson	WG	2 Coy RCEME
Smith	GE	3 Coy RCEME
Smith	GW	13 Coy RCEME
Smith	J	202 Base Wksp
Smith	LWC	DEME
Smyth	WC	204 Base Wksp
Sochasky	CN	RCSA
St Pierre	G	The RCEME School
Stever	JD	202 Base Wksp
Stewart	RH	204 Base Wksp
Stirton	J	204 Base Wksp
Storbo	RM	11 Coy RCEME
Stringer	AJ	Man Area I Staff
Szumlański	J	FGH LAD
Taylor	JF	12 Coy RCEME
Taylor	HE	3 Fd Wksp
Taylor	RT	The RCEME School
Thomas	GA	C&D Estb CAS(W)
Thompson	JT	14 Coy RCEME
Toms	FA	202 Base Wksp
Walker	J	202 Base Wksp
Walker	RL	7 Coy RCEME
Warminton	JW	3 Coy RCEME
Wasney	J	202 Base Wksp
Watt	JB	11 Coy RCEME
Weaver	CR	1 Fd Wksp
Wild	EB	LdSH (RC) LAD
Wilson	RR	1 CIBG LAD
Wright	EO	The RCEME School
Young	RJ	16 Coy RCEME